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ILLUSTRATIONS

OF THE

INTEREST AND IMPORTANCE OF THE STUDY OF CASES

OF

SUDDEN AND VIOLENT DEATH.

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OF

SUDDEN AND VIOLENT DEATH.

Cases of Sudden and Violent Death are on many accounts deserving of a very careful and a very thorough study. Taking place in various *modes*—sometimes in the way of coma, sometimes in the way of asphyxia (apnœa), sometimes in the way of syncope or asthenia, sometimes also, perhaps, in other ways;* and produced by various *causes*,—sometimes, indeed, originating "spontaneously," *i. e.* from unknown or inappreciable causes, but oftener referrible more or less obviously to the agency of intense and overpowering sensations or emotions, mechanical injuries, cold, heat, electricity or lightning, poisons, hæmorrhage, privation of air, food, &c.,—they embrace subjects of inquiry, and possess relations, which render their study alike interesting and important to the physiologist, the practitioner, and the medical jurist.

In its relations to medical jurisprudence, the subject of sudden and violent death has long engaged the attention of the profession, and is sufficiently well understood. In respect, however, of its other relations, it may, I think, be confidently asserted, that it has hitherto been too much neglected, and that the information of many regarding it is wanting in scientific accuracy and precision, and, still more, in practical utility.

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* See Williams' Principles of Medicine, p. 347, sec. 624.

This neglect and deficiency appears to be owing not so much to any want of means of information, as to the form under which that information exists. The writings of Bichat, Brodie, Wilson Philip, Legallois, Chossat, Travers, Williams (of Liverpool), Kay Shuttleworth, Orfila, Christison, and others, to whom, in various degrees, we owe our knowledge of it, are full of valuable information respecting it. As regards the entire subject, however, viewed in its several relations—physiological, pathological, practical, and juridical,—the information contained in them (besides that many of them lie but little in the way of the generality of students and practitioners) is in a great measure fragmentary, "dispersed with irregular beauty through the whole, as the riches of Nature are through the creation." There is no single work, on a level with the actual state of our knowledge, giving a complete and comprehensive view of it; and which is, perhaps, the chief cause of the neglect and deficiency alluded to, the subject is not treated of, otherwise than incidentally, in those systematic or elementary works on medical science, which have till recently been the most read and studied in the profession—a class of writings, these, which always exercise a powerful influence over the direction and tone of medical opinion and inquiry.

An important change, however, in this respect, has happily been in progress of late years. A special and complete treatise on the subject is yet, indeed, a *desideratum*, and our most recent Elements or Systems of Surgery are still defective in regard to it; but the systematic writings on Physiology, and on Pathology and Practice of Medicine, of Dr. Alison, Dr. Carpenter, Dr. Watson, and Dr. C. J. B. Williams, published within a comparatively recent period, bring it prominently into view. The nature, indeed, and the limits of the works, now specified, preclude their authors from entering on this department of their subject in so connected a manner, or with such fulness, as it is capable and well deserving of being treated. Nevertheless, the principles and leading applications of it are clearly and formally set forth in them; and it is gratifying to reflect that we are now in possession of standard elementary works, which, as they cannot fail to be extensively read and studied, will in due time lead to a more general attention being given to it, to a more accurate knowledge of it, and to a juster appreciation of its importance.

To contribute towards this is the design of the following illustrations:—

I. Cases of sudden and violent death are interesting and important in relation to physiology; the highest principles and most useful applications of which (being peculiarly conversant with them) they serve admirably to illustrate.

To physiology, in fact, it belongs to investigate the *modes* in which they take place, *i.e.* the changes in the living actions of the system which lead to and constitute death by coma, by asphyxia, by syncope or asthenia; and also the relation which they bear to the *causes*, formerly enumerated, by the agency of which they are remotely produced.

And this investigation, if rightly conducted, naturally discloses the mutual connections and the comparative importance of the different fluids, organs, and actions of the body; and their relation to those external agents, or circumstances, which either form what is properly called "conditions of vitality," or minister to, or are inseparably connected with, the objects, the pursuits, the accommodations, or the necessities of human existence, and by which the living body is habitually liable to be influenced.

It exhibits to us, for example, the living *blood* as the foremost in rank of the fluids of the body; its due proportion, and proper quality, as indispensable to the well-being of the system; its removal from the vessels in excessive quantities, or its insufficient renewal, or its deterioration, as fraught with injurious or fatal consequences:—the *circulation* of this fluid as the most fundamental of the functions of the living body; its *performance* as essential not it
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(yet subservient) to that of all the others; its failure as suspending their exercise, and, if permanent, involving necessarily their extinction, and the destruction, also, of the organism,—its own dependence on the due quantity and quality of the blood, and on the integrity of certain structures, and the exercise of certain actions which serve as the organs and the moving powers, in and by which it is carried on,—its dependence also on certain external agents, and more immediately on atmospheric air:—the organs and the function of *respiration* as the means whereby that air is brought into contact with the blood, and the purity of this fluid maintained; the indispensable importance, in subserviency to the circulation, of the continual exercise of this function, and the rapidly fatal effects of its suspension even for a very few minutes:—the *nervous system* as the seat and the instrument of the immaterial, conscious, *mind*,—requiring, for the exercise of its peculiar functions, the continual circulation through it of arterial blood, and immediately dependent, therefore, on the functions of circulation and respiration; holding, however, in its turn, important relations towards them—as regards the latter (the respiration), forming part of the conditions necessary for its performance, and rapidly causing its suspension when its own functions are abolished or arrested; as regards the former (the circulation), serving as the medium whereby various agencies, mental or physical, directly affect and influence it (exciting or depressing, or arresting it), but not furnishing any part of the conditions necessary for its exercise.

It exhibits to us, also, the organs and the functions of *digestion* and *absorption* as the means whereby supplies of food, furnished from without, are taken up into the system; the importance of those supplies, and the fatal effects of their being withdrawn:—the organs and the function of *excretion*, as provisions whereby certain products of the vital actions of the body are separated from the blood and expelled the system, and the injurious or fatal effects consequent on the suppression of this function, *e. g.* at the liver, kidneys, or lungs:—the *muscular organs*, and the vital property of *contractility* inherent in them, as the means whereby the visible movements of the body are performed; their importance, in relation to the *objects* of animal life, as essential to the functions of voluntary, instinctive, and reflex, or sympathetic motion; their more immediate importance, in relation to the *conditions* of existence, as forming part of the provisions for the exercise of the functions of circulation, respiration, digestion, and excretion.

It exhibits to us, farther, a certain *temperature* as an essential condition of vitality, and the importance of certain provisions without and within the body, in order to that temperature being maintained both in the surrounding medium, and in the interior of the living body; and also the influence on the latter of extremes of *heat* and *cold*; and, lastly, the influence upon it of various *external causes*, in the midst of which we habitually live and move, or to which we are continually exposed, and which often prove the occasion of sudden or violent death: *e. g. electricity* or *lightning*, *poisons*, and *mechanical injuries*, of every kind.

II. Cases of sudden and violent death are interesting and important on their own account, and with a view to the means of obviating the fatal issue of the changes in which they consist.

To see a fellow-creature, just previously in the rudest health, suddenly struck down by a violent blow, or ~~a stroke of~~ by lightning; or sink, and remain immersed in deep water; or overwhelmed by a bank of earth, or sand; or suffering from the effects of a deadly poison; or burnt or scalded over the whole or the greater part of the body; or lying in the snow; or weltering in his own blood—this gushing from a wound; or hanging suspended by the neck;—the individual in any of these possible and not uncommon cases being still *alive*, but either struggling for his life, perhaps convulsed, or motionless, faint, insensible, livid, or pale, cold, and nearly pulseless,—this is a sight which, while it appals and dismays us, never fails to create in us a deep interest in behalf of the sufferer, and to call forth our most active endeavours for his rescue.

But, great as is the interest which, by the constitution of our nature, attaches to cases of this kind, their practical importance is still greater. For the fearful urgency of the danger, the rapidity with which death advances, the necessity for meeting the danger promptly and at the same time judiciously,—all conspire to demand of us a thorough knowledge of their real nature, and of the means the best adapted to obviate a fatal result. Here a false step may be irretrievable: a right one too long delayed unavailing. Doubtless, many of these cases are inevitably fatal, "are such as no practice will save," but some of them may be recovered from, and in every case we ought to be fully prepared to do that, be it little or much, which the circumstances of it require.

And yet, I apprehend, it not unfrequently happens that they are very improperly treated. Persons suffering from a severe concussion of the brain, lying insensible, and nearly pulseless, with perhaps only a few feeble strokes of the heart between them and death, have been bled from the arm, and had their death thereby hastened,—or, however, have had their veins opened, and death only not hastened because no blood flowed! Nothing, indeed, is more remarkable than the indiscriminating eagerness with which, in cases of "sudden seizure," bloodletting is often resorted to by medical men, and, still more, with which its adoption is always urged upon the practitioner in attendance by the ignorant spectators. And it requires not a little moral courage, in these cases, to resist the popular prejudice in favour of the remedy. Again, the artificial respiration has been dispensed with by some, in cases of suspended animation from drowning, as unnecessary or injurious,* although it may, I think, be confidently asserted that all other measures, however important or indispensable as auxiliaries, are not to be put in comparison with it.† It is no doubt true that individuals have been restored without that expedient, and that in many instances where it has been used it has completely failed; but these facts surely do not warrant the conclusion (which is strongly opposed by other facts, and by theoretical considerations) that the artificial respiration judiciously employed ought in any case to be dispensed with, or regarded as operating injuriously*. Once more, it cannot be doubted that lives which might have been saved have been lost, in cases of narcotic poisoning, by trusting too exclusively to the stomach-pump, and other expedients, and too little to the efficacy of keeping the patient's sensibility roused by every possible means, or, failing this, of the artificial respiration. Unfortunately, it too often happens in these cases that the circulation is so enfeebled at the same time that the sensibility is impaired or abolished, that the measure last alluded to must prove unavailing. Still, the experiments of Sir B. Brodie†, and the recovery of one case of apparent death from opium in the human subject, by Mr. Whately‡, shew generally the value of the artificial respiration in cases of narcotic poisoning, and give us reason to expect that it may be successful in some such which would otherwise terminate fatally.

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* For references, see Taylor's Manual of Medical Jurisprudence, pp. 507-8.

† Carpenter, Lib. of Pract. Medicine, (art. Asphyxia) Vol. iii. p. 230. Alison, Outlines of Path. and Pract. of Medicine, p. 30.

The fearful urgency, I repeat, of this class of cases, and the promptitude and judgment with which the danger attending them must be met, and the frequency of their occurrence, demand for them a very serious study at the hands of the profession. And yet it may be asked, whether many teachers in our medical schools make them an integral, not to say a prominent, part of their course of instructions?

III. These cases are interesting and important, also, in relation to the civil and criminal jurisprudence of the country.

On this department of the subject I deem it unnecessary to make any remarks, because it is sufficiently attended to, and well understood. I would only observe that, while it is chiefly from works on medical jurisprudence that the greater part of students and practitioners have heretofore derived their scientific knowledge of this class of cases, the subject is not always there treated of, in a physiological point of view, with the precision and accuracy which is so desirable, and certainly not in such a way as to supersede the necessity for information regarding it being sought for elsewhere, and for its being prosecuted both for its own sake, and the important uses to which its principles may be applied in the study and practice of medicine.

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* An experiment of Bichat illustrates admirably the efficacy of the artificial respiration in cases of this kind. "If a stop-cock be adapted to the trachea, exposed and divided, and afterwards it be shut, the blood becomes darker, and springs for a short time with its usual force" from a divided artery, "but at length the jet becomes gradually feebler. *Re-admit the air*, the blood becomes almost immediately red; its saltus also rapidly increases." Sur la Vie, &c. p. 222:—quoted from Dr. Kay's paper, in Edin. Med. and Surg. Journal, Vol. xxix. p. 41-2.

† Philosophical Transactions, 1812.

‡ Medical Observations and Inquiries, Vol. vi. p. 331.

IV. Farther, the study of these cases is interesting and important in relation to pathology and practical medicine, inasmuch as they give us clear and distinct ideas, not otherwise attainable, in regard to the leading phenomena and general nature of diseases,—their more intimate or essential nature,—the modes in which they prove dangerous, or fatal to life,—and the agency of their remote, or external causes. In this respect their study is singularly valuable both to the practitioner and the student of medicine, serving to the latter as an excellent introduction to the more difficult study of diseases, and furnishing the former with landmarks, or principles, which admit of a very easy application, or are important guides to him at the bed-side of the sick.

The cases in question, occurring in individuals previously in perfect health, can scarcely be said to be examples of *disease*. At least, if they are to be so regarded, they are instances of the simplest and least complex kinds of it; for the changes intervening between the application of the external cause, and the fatal event which rapidly follows, must necessarily be *few* in number and *simple* in their character. The changes, too, on which this event is more immediately dependent, are easily discriminated. The symptoms, also, accompanying the internal changes, are equally simple, intelligible, and for the most part characteristic. And the relation subsisting between the external causes and the effects which follow on the vital organs, has nothing "occult" in it, but is direct and palpable, and open to every one's observation. Thus, one has a large blood-vessel wounded; the blood gushes out in torrents; in a few seconds he becomes giddy, pale, and faint, perhaps he sickens and vomits. The nervous system has sustained a shock by the large and sudden loss of blood; the shock re-acts on the heart, enfeebling its action; and to the state of one or other of these organs are the symptoms enumerated owing. The bleeding continues, and, within a few seconds more, the sensibility fails altogether, and the pulse becomes imperceptible. The syncope is complete; the heart's action is suspended, the circulation through the brain arrested; and if the irritability of the former is extinct, the syncope is fatal.—Another is struck a violent blow on the epigastrium; he instantly turns pale, falls down insensible, the pulse is imperceptible, and he expires. Here, again, is an instance, simpler even than the former, of a shock being given to the nervous system, and of this reacting on the heart, suspending its action, and destroying its vital power.

In the examples now given of death from hæmorrhage, and from a blow on the stomach, how short is the series of changes between the first and the last, how simple their character; how obvious their relation to their respective causes; and how clearly referrible the fatal issue of both to the failure of the heart's action!

It is widely different, however, with most diseases. Arising, often, from unperceived causes, and often terminating fatally in modes that are complex or obscure, they extend over a longer period of time, consist of a longer series of changes, involve various functions, and show themselves by symptoms which vary with their progress, and are modified by the circumstances of individuals.* Amid such a multiplicity and complexity of changes, it is difficult to discriminate between the essential and the incidental, to trace the connection between causes and their effects, and to acquire clear notions of the real nature of the phenomena that are presented to our observation. Take, as an example, common continued fever. In this disease, all the functions are more or less engaged, and the morbid phenomena very numerous—varying with the progress of the fever, variously modified too by contingent circumstances, and complicated besides, in many cases, with local inflammation.

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* Brit. and For. Med. Review, vol. iii. p. 303.

This being the case, it is easy to understand that we should often be unable, from the observation of diseases themselves, to form a correct judgment of the nature of many diseases which come before us. But this difficulty may often be greatly obviated, or entirely removed, by a careful study of the effects of violent and rapidly fatal injuries. "These simplest cases in pathology" furnish us with facts and principles, (or "analogies and illustrations,)" which admit of an easy and direct application to morbid processes and morbid phenomena; and thus they shed a clear and steady light on the more complex and obscure cases of disease—illuminating, so to speak, these special objects of pathological research much in the same way that the mirror does the objects subjected to microscopical examination.

"When we complain," to quote the words of an able writer, "of many of the phenomena of disease being *inexplicable*, we are too apt to forget that *nothing in nature is explicable*, except in so far as it admits of *comparison* with things that are *simpler* and *more familiar*." Now the things simpler and more familiar with which morbid phenomena may be compared, and by a comparison with which they may be explained, are very few. The known principles of chemistry and of mechanics are of little avail in elucidating their nature. Those of physiology, indeed, enable us to go a certain way in our explanation of them, "by informing us what functions of the living body are disordered, in what manner they are altered, and how their alteration affects other functions;" but it would be easy to shew "that there are many facts in regard to the operation of external causes on the human body, and the modes of diseased action assumed by its different organs, which could not possibly be cleared up to us by any knowledge we possess of the healthy actions of the system." "But the effects of known agents, particularly of poisons and injuries, on the animal economy, are phenomena bearing a very close analogy to those which occur from unknown or imperfectly understood causes in disease; and when the former are successfully arranged and generalized, they will afford more assistance than all other means put together, in explaining the more complicated changes which give rise to the latter."*

To point out their utility in this way will form the subject of the remaining part of this paper.

I.—OF THE STUDY OF CASES OF SUDDEN AND VIOLENT DEATH AS ILLUSTRATIVE OF THE LEADING SYMPTOMS AND THE GENERAL NATURE OF DISEASES.

THE utility of these cases in this respect will best appear from the consideration of some diseases as actually illustrated by them. We may begin with that of malignant cholera—a disease which may be said to occupy a middle ground between the cases in question and the more ordinary forms of acute (febrile) disease. It will be in the recollection of many, that some years ago, when the disease was rife among us, a vast variety of opinions were broached as to its nature, and that it was generally believed by the public to be a disease which the profession did not *understand.* Many of those opinions were sufficiently absurd, and, doubtless, there are many points connected with the disease, and especially its mode of origin and diffusion, still unknown to us, or imperfectly understood by us. But I humbly submit, that there is nothing very mysterious or unintelligible in its pathology; and that if medical men would bring to the investigation of it a clear perception of the principles furnished by the study of the effects of violent injuries, and especially of the sedative poisons, on the living body, there would be a pretty general agreement among them on the subject. It would then, I think, appear, and be generally acknowledged, that cholera is a disease which, with distinctive peculiarities of its own, bears a very close resemblance, in its leading features, to cases of poisoning by arsenic or corrosive sublimate; being attended and essentially characterised, as these cases are (besides by copious vomiting and purging, and cramps, which are sometimes wanting), by extreme depression of the heart's action, prostration of the nervous and muscular powers, and like them, proving fatal in the way of syncope or asthenia. What is matter of regret in regard to this disease is, not that its nature is unknown, but that its fatality is so great, and the power of medicine over it so feeble. In these respects, however, it does not differ materially, if at all, from the effects of the poisons specified; and were these to operate for a season as effectively and as extensively on the human race as the unknown cause of cholera recently did, while the alarm would be equally great, no embarrassment would be felt in pronouncing on the nature of such an epidemic.

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* Alison, Outlines of Pathology and Pract. of Medicine.—History of Medicine.—Edin. Med. and Surgical Journal. Vol. xxvi. p. 319.

A similar illustration might be given of the pathology of that rare form of common continued fever denominated (unfortunately, because calculated to mislead us) the *congestive*, and which is allied, in many of its features, to cholera; of the pathology of plague, and of the worst or congestive forms of scarlatina, measles, erysipelas, &c., all of which, more or less, are cases "in which (as Dr. Alison well observes) the sedative agency of the remote cause of the disease acts with extreme force, the usual febrile reaction is suppressed or obscured, and the symptoms of the first or cold stage assume their maximum of intensity;"* "feebleness of pulse, coldness of surface, muscular debility, and depression of all the functions of the nervous system, approaching and sometimes amounting to, complete coma, being the leading symptoms; spasms attending some cases, and vomiting others†." Now these are precisely the symptoms, and the essential characteristics, of concussion of the brain, and of many cases of poisoning.

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* Cyclopædia of Pract. Med., vol i. p. *c*.

† Outlines of Pathology and Practice of Medicine, p. 396.

Again, there are two varieties of peritonitis, different from the common form of that disease, the phenomena of which are satisfactorily elucidated—those of the one by the effects of a blow on the stomach, those of the other by the effects of certain sedative poisons. The varieties alluded to are—the peritonitis arising from the rupture, or from a perforating ulcer of the stomach or intestines, with escape of the contents of these into the cavity of the peritoneum, and that which occasionally prevails as an epidemic among lying-in females, but sometimes occurs sporadically—in both of which, with distinctive peculiarities in the case of each, there is rapid sinking of the *vis vitæ*, and, on examination after death, comparatively slight marks—nay, sometimes no marks at all—of inflammation. Yet there is no difficulty in understanding the nature of these cases, when we take into account the effects, and the rapidly fatal issue of these, even independently of inflammation, of violent mechanical injury of the abdomen, or of certain poisons taken into the system.

Again, to be called in to a case of jaundice, and find the patient become first drowsy and delirious, and then profoundly comatose, and see him die of coma within a few days from the commencement of his illness—symptoms and a result, these, very different from those attendant and consequent on an ordinary case of that disease—would, some years ago, have embarrassed not a few practitioners. But the rationale of this rare form of jaundice is now satisfactorily made out, first, by the fact that the secretion of bile at the liver is *suppressed*, the bile-ducts being found, on examination after death, to be pervious and empty; whereas, in the ordinary cases of that disease, the bile is secreted, but cannot, in consequence of obstruction, find egress by the ducts: secondly, by a comparison of that with this other fact, that in the ischuria renalis, the symptoms of which are exactly similar to those constituting the peculiarities of this form of jaundice, the secretion of urine is suppressed, and urea appears in the blood: thirdly, by a comparison of both these diseases with the effects of extirpation of the kidneys in the lower animals: and lastly, by a comparison of this whole set of facts with the action on the nervous system of narcotic poisons:—from all which it appears that the bile is retained in the blood, and, accumulating unduly there, operates as a poison on the nervous system, producing coma, and death by coma.

Once more, apoplexy is a disease the several varieties of which are particularly well illustrated by a reference to certain kinds of violent injuries, and the effects of narcotic poisons. The coma which is common to all the varieties of apoplexy is precisely similar to that produced by an over-dose of opium. And when we see that such a case of poisoning may prove fatal without any mechanical lesion of the brain, or without any change in it that can be recognised as morbid, it need not surprise us to find that cases of apoplexy occasionally occur and prove fatal without hæmorrhagic effusion, and often without visible change of any kind in the brain. Such are the cases described by Dr. Abercrombie under the name of *simple apoplexy*. Farther, when we consider the inefficacy on the heart's action of slight injuries of the brain, or of injuries confined to a very limited portion of the organ, as seen in experiments in the lower animals*, and when we remember that in most cases of sanguineous apoplexy the effusion is comparatively small in quantity, and limited in its extent, we can easily understand the reason why the "*superstite motu cordis et arteriarum*," introduced by Cullen into his definition of apoplexy, should constitute so generally a negative but important characteristic of the disease. And yet, when we keep in mind the sedative effect on the heart's action of severe and extensive mechanical injury of the brain, as exhibited in the syncope consequent on a violent blow on the head, and still more unequivocally, perhaps (as in the well-known experiments of Dr. Wilson Philip, and others), in the immediate cessation of the heart's action produced by suddenly crushing large portions of the brain or spinal cord, we can have as little difficulty in understanding the nature of those other, and uniformly fatal, cases of apoplexy, in which, simultaneously with loss of sense and of voluntary power, there is faintness, paleness, feebleness of pulse,—*i. e.* a state of syncope—the patient afterwards rallying, and then becoming profoundly comatose, and where, on inspection after death, there is found within the head, generally either in the ventricles or at the base of the brain, a far greater and more extensive effusion of blood than usual. Such is the character of one variety of apoplexy, first accurately described in this country by Dr. Abercrombie, and spoken of by the French pathologists, when rapidly fatal, as the "*apoplexie foudroyante*;" and such the *eclaircisement* given of it by those simpler cases in pathology resulting from mechanical injuries of the kind referred to, and to which we give the name of concussion or shock; and also (its resemblance to which was first pointed out by Dr. Abercrombie) by those well-known cases in surgery where a person receives an injury or concussion, and has a blood-vessel ruptured within the cranium. These illustrations might easily be multiplied.

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* And the essential independence of the heart's action of the nervous system, as shewn by its continuance for hours together after the *careful* removal of the whole brain and spinal cord; the respiration being, meanwhile, artificially maintained.

But, besides the interest which arises from the explanation of morbid changes and their attendant symptoms, and besides the general importance of an intelligent apprehension of their nature, it is in many cases of the utmost practical importance to obtain such a knowledge of them *at the earliest possible period*, in order to understand the danger to be apprehended in their course, to apply the proper remedies early, and with confidence, and to avoid the use of those which, either presently or afterwards, might give them an unfavourable turn. It is obvious, however, that, as every disease "consists of a long series of changes, involving various functions of the body, and showing themselves by symptoms which vary in the progress of the case, and are modified by the circumstances of the patient, it must often happen that we shall be unable, from seeing certain only of the changes that are going on, and these only during a portion—often a very variable portion— of their progress," to decide confidently as to the nature of, or "give truly scientific names to," many of the cases which come before us.* Therefore, "certain symptoms, or sets of symptoms," certain states of the body, diatheses, or tendencies, "are often invested with a practical importance hardly inferior to genera of disease, demanding or justifying the use of remedies in many cases where it is still uncertain of what disease they form a part"—such, *e. g.* as headache, nausea and vomiting, coma, delirium, dyspnœa, diarrhœa, tendency to syncope, comatose tendency, typhoid tendency, putrescent diathesis, hæmorrhagic diathesis, nervous irritability, &c.† Now, most or all of these individual symptoms, tendencies, or diatheses, may, equally with those entire combinations and successions of them which constitute particular diseases, be illustrated by a reference to cases of sudden or violent death.

In concluding this general head, it may be remarked of the effects themselves of the causes of sudden and violent death, that when they do not prove quickly fatal, or are actually recovered from, they yet leave the system in such a state as exerts a powerfully modifying influence on any strictly *diseased* actions (whether febrile, inflammatory, or nervous) that may naturally or incidentally be consequent upon them; and, in particular, that they give a gangrenous tendency to the inflammation, and a typhoid tendency to the fever—the latter assuming, in different cases, either the adynamic or the atactic form, or, even at different periods of the same case, first the one form, and then the other. Mr. Travers' work on Constitutional Irritation abounds in illustrations of this general observation.

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* Brit. and For. Med. Rev. vol. iii. p. 303.

† Ibid. vol. iii. p. 303; Alison, Outlines of Pathology and Practice of Medicine, pp. 34, 35.

II.—OF THE STUDY OF CASES OF SUDDEN AND VIOLENT DEATH, AS ILLUSTRATIVE OF THE MORE INTIMATE OR ESSENTIAL NATURE OF DISEASES.

THE study of these cases probably gives us much less insight into this department of pathology than into that last treated of. There are two points, however, connected with it, in regard to which it affords more satisfactory information than would otherwise be attainable.

1. In the first place, with regard to what is termed the primary elements of disease, it supplies certain of the facts on which is founded the opinion now very generally held, that they have often their seat in the *fluids* of the living body, exclusively in some cases, and equally with the *solids* in others, and perhaps in most; and, therefore, that any system of pathology, to be complete and satisfactory, must have *humoralism* as well as *solidism* for its basis.

It would not be easy, indeed, from this source alone to furnish clear and unequivocal proofs of the correctness of that opinion, because in fact it rests on the combined force of a variety of considerations, physiological and pathological, chemical and microscopical. It would be still less easy to do so without entering into minute details. It may suffice, however, to have thus alluded to the subject, and to point simply to the facts in the history of cases of violent death, which form part of the general body of evidence. These are—the fluid state of the blood, implying loss of its vitality, so generally met with in this class of cases, and simultaneously produced, we cannot doubt, in many instances at least, with the extinction of the vital power of the solids;—other less appreciable and more variable changes in that fluid consequent on the introduction of poisons into the circulating mass;—the injurious influence (whether negative or positive), of imperfectly arterialized blood on the solids of the body generally;—its especial influence on the circulation through the lungs, and, according to some, on the brain and nerves;—its non-oxygenation as the primary origin of the changes constituting asphyxia, its re-oxygenation, by the artificial respiration, in cases of apparent death from that cause, as the equally primary origin of those by which re-animation is effected,—the former directly arresting the circulation through the lungs, the latter renewing it, and that prior and essential to the failure, in the one case, and to the restoration in the other, both of the heart's action and the functions of the nervous system.

2. In the second place, it is calculated to disabuse our minds of the notion, less prevalent now than formerly, but still entertained by many, especially in France, that disease has either generally, or always and necessarily, its origin in change of structure; that the rationale, therefore, of any disease may be had by observation of the organic lesions left in the dead body, in fatal cases; and that the terms pathology and morbid anatomy are synonymous.

The notion in question seems to rest on no firmer footing than this—organic lesion being so often met with after death in those cases of disease which terminate fatally, and it being necessarily impossible to ascertain, anatomically, the state of the different organs and textures, in those other cases (always the great majority of the whole) which terminate favourably,—it is concluded that what obtains in the fatal cases holds also in respect of all or most of the others.

Were it not that in this, as in other matters, things *seen* fasten themselves on our minds, while things *unseen* are often disregarded, and that thus our judgment of their true relations is distorted, it might be supposed that a consideration, on the one hand, of the fallacy of such reasoning, and, on the other, of the whole history of many diseases, as observed during life, and of this fact in particular, that after many fatal diseases, the different organs exhibit, everywhere, all the characters of health, would have prevented that conclusion being ever seriously entertained, or widely received. It might be supposed, at least, that such a consideration would suffice for the refutation of it—a supposition which is probably correct. At the same time, there can be no doubt that its force is greatly enhanced by the consideration also of cases of sudden death, and that it is by a reference to these that the conclusion in question can best be shewn to be erroneous.

The peculiar value of these cases, in this point of view, lies partly in this; that, while *very many* of them prove fatal, *very few* of them leave behind them any morbid appearances in the dead body; and partly also in this; that, when such appearances are met with, the simplicity of the cases, and the rapidity with which the changes constituting them succeed each other, enable us to judge more accurately than we can do in respect of diseases, of the relation which they bear to the lesions observed, and thus prevent our attaching an undue importance to these.

Thus, an individual takes, or has administered to him, a large dose of strong prussic acid, or a large dose of opium, or is immersed for a short time in boiling water, and dies within a few minutes or a few hours thereafter; or is killed instantly by a stroke of lightning, or almost instantly by a violent blow on the head or abdomen, or drops down dead after violent muscular exertion, or under the influence of some overpowering mental emotion; and, on examining the dead body in any of these cases, we seldom discover any morbid appearances in the vital organs—any, at least, which can be distinctly recognised as morbid. Yet have the vital *properties* and *actions* of these organs been affected not only in a way sufficient to destroy life, and that very rapidly, but in a way strictly analogous to that which constitutes the essential characters of many diseases.

And even where, after some such cases of sudden death, we do find morbid lesions in the dead body, *e. g.* those produced by arsenic or other acrid poisons,—it is at once felt to be obvious, in regard to many of the cases, that the lesions met with afford no sufficient explanation of the whole symptoms observed during life, or of the fatal event. The constitutional effect of arsenic, for example, which gives to cases of poisoning by that mineral their essential features and their urgent danger, and which operates as the cause of death, is seen to set in too early, and to be too disproportioned to the local effects of the mineral, to allow of its being wholly or even chiefly referred to these. Yet does it leave behind it no other marks of its having existed during life.

Cases, then, of sudden and violent death may be referred to as affording clear and decisive proof that the vital *properties* and *actions* of the different organs and textures of the living body may be changed or altered, and that to an extent sufficient to destroy life, independently of any changes in the *structure*, or *organic constitution*, of the organs and textures themselves.

We need, therefore, have no difficulty in understanding (at least we need not regard it as mysterious), that many diseases, *e. g.* fever, certain forms of inflammation, of apoplexy, of jaundice, the ischuria renalis, tetanus, hydrophobia, &c. should exist and prove fatal, without being attended by any organic lesions; and we may understand, farther, that when such lesions are met with, they may give no explanation of the nature, nor even of the fatal event, of those diseases; or, however, that "the information which they give is available for the explanation of the phenomena only up to a certain point*."

The healthy appearance, indeed, of all the organs after fatal cases of disease, is an important negative fact in their pathology. It gives us no positive insight into their real nature, but it shews us what their nature is not. It proves that neither their essential phenomena nor their fatal issue are susceptible of explanation in this way (in which point of view it is just as valuable as where, in other cases, there are morbid appearances which afford a satisfactory explanation of their nature and event), and that these diseases, at least, must essentially consist in changes of, or deviations from, the natural or healthy *actions* of the living body.

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* With respect, generally, to the pathological value of morbid lesions, it may be here stated, that "it is not a short process of reasoning only, but a whole science, that intervenes between the observation of morbid lesions and the application of the knowledge thus acquired to the pathology and treatment of diseases; and one of the most important subjects for investigation which this science comprehends, is the question, how similar lesions should be found in connection with very various symptoms, and very various lesions with symptoms remarkably similar,"—a question, this, which sufficiently indicates "the essential distinction between morbid anatomy and pathology." (British and Foreign Medical Review, vol. iii. p. 302.)

But we may, I apprehend, take up a higher position, and maintain that not only *some*, but *all* diseases, consist originally and mainly throughout their whole course of changes in the vital *actions* of the different organs—some of them *causing*, others not, changes in the structure of the organs; and that not only *some* but "*all* alterations of structure must themselves have resulted from *previous diseased actions*[*]." This is a doctrine widely different from the one to which it stands opposed. It is not my intention, however, and it would be foreign to the object I have in view, to dwell upon it. It is advanced merely for the sake of contrast, and I shall rest satisfied with having shewn the contrary doctrine to be erroneous, or rather with having directed attention to the interest and importance, and the peculiar value, of the study of cases of sudden and violent death, as affording decisive proofs of its erroneousness.

The considerations which have now been urged in opposition to this erroneous doctrine, are so similar, in their general scope and object, to those stated, more briefly and much more forcibly, by the reviewer, in the Edinburgh Medical and Surgical Journal, of Mr. Travers' work on "Constitutional Irritation," that I cannot forbear introducing them here.

"It is not the least important effect of Mr. Travers' inquiries, that they will fix the attention of medical inquirers for a time on diseased actions, which, although quickly and often inevitably fatal, leave behind them no marks of injury of any of the vital organs discernible on dissection. So much has been said, of late years, of the various genera and species of 'organic lesions,' that medical inquirers seem disposed to forget that pathology is the science of diseased actions, not of diseased structures. The study of these last is, in fact, theoretically important only in so far as it elucidates the process by which they have been formed, and the alteration of the functions of parts essential to life which has accompanied them, sometimes as their direct and necessary effect, at other times as an indirect or sympathetic consequence. And this study is practically important only in so far as the information thus acquired tends to explain and confirm, or to invalidate, the efficacy of the means by which these diseased actions are thought to be prevented, modified, or controlled. In every case a process of reasoning is necessary, to enable us to draw any useful inference from the observation of diseased structures; and that observation must be connected, not only with the symptoms recently preceding death, and resulting from the organic lesions themselves, but with the whole train of circumstances that preceded their development, and with the symptoms that marked the earlier steps of their formation.

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[*] Alison's Pathology and Practice of Medicine, p. 39.

"That the attention of pathologists may be recalled to these obvious but somewhat neglected truths, it seems to be peculiarly important to dwell for a little on the class of cases which are the subject of the work before us—cases of extreme interest, and of urgent danger, in which the actions of the vital organs are either suddenly arrested, or rapidly suppressed, by a known cause; but in which examination after death presents no such organic lesions of these organs as can be supposed to have produced the fatal event, or even no such appearance as can be distinctly recognized as morbid; in regard to which, therefore, the conclusions of the pathologist must rest on the observation and comparison of symptoms, and of symptoms alone." *

As a right apprehension of the nature of pathology, and of its relation to morbid anatomy, is of real importance, I hope I may be allowed to quote, also, the following remarks on the subject by Dr. Alison, in his "History of Medicine in the Present Century." They do not, indeed, like the former quotation, illustrate the subject by a reference to cases of sudden death, and are therefore in a manner foreign to the object of this paper; but the sentiments generally are strictly in accordance with those just expressed, and are such as deserve to be "read, marked, learnt, and inwardly digested," by every practitioner.

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* Ed. Med. and Surg. Journ. vol. xxvi. p. 320-1.

After stating that "the additions which have been made to our knowledge of the nature and proper treatment of diseases during the time under review, may be traced, for the most part, to the extent and minuteness with which the study of morbid anatomy has ben cultivated;" and while he observes that "it is evident that the department of morbid anatomy is that in which the grand improvement of medical science has lately been effected, and that it is from judicious reasoning on the more intimate knowledge thus acquired of the nature of diseases, that any material improvement in the precision of our practical rules has resulted," Dr. Alison says—

"This study has, indeed, engaged so much attention of late years, that the term pathology has very often been used as synonymous with morbid anatomy: as if there were no other sources, from which we could draw our knowledge of the changes in the living body, constituting disease, than the changes in the dead body which disease leaves behind it. This, however, is a manifest error in science. These alterations in structure produced by disease are only one of the elements of our reasoning on the nature of diseased actions themselves; and there are many other facts, as to the external causes of diseases, the nature of their leading symptoms, their consequences, local and general, in the living body, and the *juvantia* and *lædentia* affecting them, which likewise furnish the proper elements of inductive reasoning, for the determination of those laws of the animal economy, which it is the object of the science of pathology to establish.

"It is also an important practical error to fix the attention, particularly of students of the profession, too much on those characters of disease which are drawn from changes of structure *already effected*, and to trust too exclusively to these as the diagnostics of different diseases; because in many instances these characters are not clearly perceptible until the latest and least remediable stage of diseases; the very object of the most important practice in many cases is to *prevent* the occurrence of the changes on which they depend; and after they are established, the cases are very often hopeless, or admit only of palliative treatment.

In those diseases in which most can be done by art, our practice must always be guided in part by conjecture, because, if we wait for certainty, we very often wait until the time for successful practice is past; and therefore, although an accurate knowledge of the whole history of each disease is essential to its proper treatment, yet in a practical view the most important part of its history is the assemblage of symptoms, by which its nature at least, if not its precise seat, may often be known, before any decided lesion of structure has occurred. Accordingly, when this department of pathology is too exclusively cultivated, the attention of students is often found to be fixed on the lesions to be expected after death, much more than on the power and application of remedies, either to control the diseased actions, or relieve the symptoms, during life."*

One word more as to the proper use of morbid anatomy:—

The proper use to be made of morbid anatomy, "is to correct the histories, and remodel the distinctions and arrangements of diseases," as drawn from the observation and comparison of symptoms merely,—"to separate those distinctions which are essential and uniform, and founded on the nature of diseased actions, from those which are dependent on adventitious circumstances, and therefore liable to continual variation,—and thus to give simplicity and precision to our views of the distinctions among diseases, and facilitate the application of practical experience.

"It is true that there are many diseases into the nature of which morbid anatomy gives us no insight; and that, with respect to all, the information it gives is available for the explanation of the phenomena only up to a certain point; but it always enables us to judge whether a disease, or the fatal event of a disease, is susceptible of explanation in this way or not. It is always one of the elements by which we are to judge of the nature and the true distinctions of diseases; and those cases in which nothing is seen to account for the fatal event, are just as valuable in this view as those where it is most satisfactorily explained."*

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* Cyc. of Pract. Med. vol. i. pp. lxxxvii-i. See also, Brit. and For. Med. Rev. vol. iii. p. 302: and Outlines of Path. and Pract. of Med. p. 38, et seq.

III.—OF THE STUDY OF CASES OF SUDDEN AND VIOLENT DEATH AS ILLUSTRATIVE OF THE MODES IN WHICH DISEASES PROVE DANGEROUS OR FATAL TO LIFE.

THE practical interest and importance of a knowledge of this part of the history of diseases, lies in its enabling us to form a proper estimate of the danger and probable issue of any disease, and in giving precision to our ideas regarding the main objects of practice in the treatment of it. It is quite obvious, indeed, in respect to this last, that "it is only by anticipating the kind of fatal termination which is most probable in each case, that we can expect to be guided to a rational and scientific selection of remedies."†

Now there are three leading facts as to most of the diseased states of the living body, which with reference to prognosis and practice, it is necessary to keep constantly in mind. The *first* is, that they are essentially temporary in their nature, the morbid actions subsiding after a time. The *second*, that they have a natural tendency to terminate favourably of their own accord; and that there are provisions in the economy for obviating their injurious consequences, and securing the restoration of the natural structure and functions of the parts affected. The *third*, that they are nevertheless liable during their progress to the occurrence of changes, which may in the meantime or subsequently be fatal. These changes sometimes form a part of the diseased actions themselves; at others they are extraneous or incidental to them. They vary in their degree, and are just as temporary as any of those actions; and, therefore, if we can but keep them within due limits, or prolong or maintain life till they have subsided, all will be well.

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* Brit. and For. Med. Rev. Vol. i. pp. 28-9.

† Alison, Outlines of Pathology and Practice of Medicine, p. 31.

These propositions may be illustrated by a reference to one or two diseases. Take, first, a disease where the dangerous changes are extraneous to the morbid action constituting that disease. Such an one is laryngitis. The inflammation would in due time wear itself out: viewed irrespectively of the part it occupies, it has as strong a tendency as other diseases of the same kind to terminate favourably; and the inflammatory effusions, plastic, serous, or purulent, or any ulceration consequent upon it, would in due time be removed or healed up. But while yet running its course, and before there is time for its spontaneous abatement, or for the restorative provisions of nature coming into play, the disease is liable, owing to its peculiar seat, to the occurrence of a change that may be fatal—a change, however, which forms no part of the morbid action itself. That change is *the closure of the glottis*, produced either by spasm of the muscles of the larynx, or by the inflammatory effusions. The patient is thus threatened with death from asphyxia, and, if the danger be not averted, will certainly perish. But, by making an opening into the windpipe below the glottis, we have it in our power to disconnect the disease from that incidental change, and thereby obviate the danger.

Take now a disease where the dangerous changes form part of the morbid actions. Fever is a disease of this kind, and offers various illustrations to the purpose. To a far greater extent than inflammation, this disease tends to run a definite course, and to subside favourably of its own accord. Of the morbid actions constituting it, *stupor* forms an integral part. This stupor, however, varies in degree, and may either be very slight, or amount to perfect coma. By and by, it would subside with the decline of the fever, and will do so if it be not to a degree to cut short, meanwhile, at once the life of the patient and the disease itself. Again, *an enfeebled state of the circulation*, preceded or not by excitement, and varying in degree, is part of the train of morbid actions. With the subsidence of these the circulation would regain its wonted vigour, and will do so if it be not previously depressed to such a degree as to fail altogether. In regard to the stupor, the obvious indication is, either to prevent it passing into complete coma, or, in the event of its doing so, to maintain the respiration artificially. The latter is, unfortunately, a purely *theoretical* indication; the other is, to a considerable extent, perhaps, within the power of art. With respect to the depressed state of the circulation, the indication is, to support that function.

If these views are well founded, while they teach us a lesson of caution in judging of the efficacy of remedies in the cure of diseases, and admonish us not to attribute too hastily their removal, in individual cases, to the remedies made use of during their progress,—seeing they may have subsided spontaneously, and independently, or even, where improper treatment has been resorted to, in spite of the remedies employed,—they clearly shew us, also, that the grand object of practice in the treatment of diseases is comparatively limited, and ought always to have special reference to the obviating, by appropriate means, any unfavourable change that may spring up during their progress,—in one word, *to obviating the tendency to death.* If we can but succeed in this, nature will do the rest for us, and that in virtue of the temporary character of the diseased actions, and their natural tendency to terminate favourably. Doubtless, other objects of practice exist and require attention, but they are manifestly of a subordinate kind.

Every one familiar with the writings of Dr. Cullen must remember his "memorable injunction," in laying down the treatment of fever, "to form the indications of cure upon the view of obviating the tendency to death;"* and every one that rightly appreciates the facts just stated in regard to the natural history of diseases, will recognise in that injunction a practical principle of the highest value, and applicable to the treatment, not of fever only, but of many other diseases.

Of the whole series of changes, therefore, which constitute or may incidentally be connected with a disease, the most important for us to *understand* are those which tend to a fatal termination. These, in other words, are the changes which constitute what is technically called the *modes* of death. And of the whole combination and succession of symptoms which characterise or attend a disease, the most important for us to be familiar with, and know the import of, are those which indicate that tendency, and the measure of it; that is, indicate what mode of death is threatening, and the degree in which it obtains.

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* First Lines, § 126.

But if, as happens in investigating the nature of diseases, we confine our attention exclusively to the phenomena of diseases, we shall have great difficulty in arriving at a clear knowledge of this part of their history. The multiplicity and complexity of the morbid actions render it difficult to distinguish those by which they become dangerous to life; and when they prove fatal, to make out the rationale of this event; and the like circumstance in the symptoms of diseases, makes it equally difficult to discriminate those by which danger is indicated, and thus to connect the sign with the thing signified. The dangerous tendencies, too, and the fatal event of diseases, are in themselves often complex; and "in the course of the same disease, and even at different periods of the same case, death may be threatened in very different ways." Such are the difficulties with which the study of the fatal tendencies and the modes of fatal termination of diseases is beset. If, however, we give our attention in the first instance to cases of sudden or violent death, we shall be furnished with facts that will enable us, in a great measure at least, if not entirely, to overcome those difficulties. They are cases, these, as before observed, in which the functions of vitally important organs are either suddenly arrested, or rapidly suppressed; in which the changes intervening between the application of the external cause and the fatal event, and those in particular directly producing this, are in general few in number, simple in their character, and easily understood; and in which, also, the external phenomena that attend them are equally few and simple, and for the most part characteristic.

To illustrate adequately, and as the subject deserves, what has now been stated, would occupy too great a space, and perhaps exceed my ability. But I cannot forbear introducing here the illustrations given of it by Dr. Alison in the introductory part of his Outlines of Pathology and Practice of Medicine. Though a mere sketch of this interesting and important subject, these illustrations are sufficiently comprehensive for our present purpose; and the details regarding it will be found in various parts of that work, in connexion with different morbid states and different individual diseases.

"The tendencies of different diseased actions to their different fatal terminations are obviously susceptible of illustration (as already observed) by reference to the simpler cases of sudden and violent death, already considered; and it is of the utmost importance, in all truly scientific practice, to keep them constantly in view: but it is always to be observed, that, in the course of the same disease, and even at different periods of the same case, death may be threatened in very different ways. This is especially remarkable in regard to the strictly febrile diseases.

"Generally speaking, in the most rapid or acute diseases of different parts (especially internal parts) of the body, whether febrile or not, death is threatened in like manner as by mechanical injury of the same parts; and it is very often sufficiently explained by the injury done to the structure, and consequent interruption of the function of the part. Thus, in the acute diseases of the head we are threatened with the fatal termination by coma, in those of the chest by asphyxia, and in those of the abdomen by syncope (or sympathetic affection of the heart), just as in injuries of these divisions of the body. In the more chronic diseases of the same parts, death is produced in a more complex manner, partly by the disturbance of the function of the part, but partly also by the constitutional disturbance; *i. e.* by the disorder of the general function of assimilation, or by the exhausting evacuations consequent on the continuance of the local diseased action, rather than on its local results ; and illustrated by the effects of starvation, or of hæmorrhage, rather than of more violent injuries.

"In the case of certain local diseases, particularly of the liver and kidneys, a very peculiar mode of fatal termination is sometimes observed, in consequence of the local disease leading to retention of the natural excretions, and thereby affecting the system as a narcotic poison. And it is also certain, that death from any of the strictly febrile diseases, and from certain of the inflammations which we term specific, is owing, in part, sometimes almost entirely, to the influence of causes which affect peculiarly the fluids of the body, without altering the structure of any of its solid parts, and produce changes analogous in the most important respects to the agency of poisons on the animal economy.

"It is also easy to understand, that in the course of diseases, both acute and chronic, complications of different kinds of morbid action, and of morbid changes in different parts of the body, often take place ; sometimes from accidental causes, but frequently, also, in consequence of known laws, whereby the living actions of the different parts of the body are connected together ; and that death is therefore often owing to a combination of different causes, the operation of each of which may be accurately observed, although its exact amount may not be easily assigned. The history of dropsy, in connexion with organic diseases of different internal parts, furnishes continual illustrations of this observation."*

IV.—OF THE STUDY OF CASES OF SUDDEN AND VIOLENT DEATH, AS ILLUSTRATIVE OF THE AGENCY OF THE REMOTE OR EXTERNAL CAUSES OF DISEASE.

It is unnecessary to dwell on the great practical interest and importance of this part of the history of diseases, with a view to the *prevention* of these, in individuals and communities, by the *avoidance* of their external causes. It is a subject, however, which is open to many sources of fallacy and error, and the investigation of which is beset with peculiar difficulties. Mankind in general are apt, in regard to it, to err on the side of credulity, and wont on all occasions, and with the utmost confidence, but often on no better ground than that of *post hoc, ergo propter hoc,* to attribute diseases to circumstances in any respect special or peculiar which may have recently or immediately, nay, at any time, preceded their occurrence. Not a few medical men, on the other hand, go to the opposite extreme of scepticism, and refuse to acknowledge the existence or the agency of many of the assigned or supposed causes of disease, however well established, by long and varied, and seemingly accurate observation, their reality may appear to others.

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*Outlines of Path. and Pract. of Medicine, pp 41-2-3.

It is not difficult to explain satisfactorily what has now been stated. The external causes of diseases either arise out of the very conditions of our existence, and the circumstances in which we are habitually placed, or consist of influences which have only a local and temporary existence. The former are very numerous; the variations of them more so; and the relations of different individuals to them infinitely diversified. How difficult, therefore, must it be to appreciate and estimate the exact influence of each, and what a wide field is there for error and diversity of opinion! The latter are, in their very nature, concealed from actual observation, and can be made known to us only by their effects. How easy to deny altogether the existence of such "occult" causes; or, admitting this, erroneously to assume the agency of some that exist only in the imagination.

Again, none of the causes of disease operate with absolute and uniform certainty. Of a given number of persons placed at the same time under the influence of some one given circumstance, *e. g.* contagion, the greater number may experience no bad effects. Yet, what is more common than to hear the agency of that circumstance denied as the cause of the disease which certain of those exposed to it become affected with, because the majority remained intact?* Again, the same circumstance may, in different individuals, give rise to very different diseases, and exception be taken to it, on that account, as an efficient cause of disease at all.

Once more, the combined agency of two or more causes is often concerned in, and appears to be essential, in many cases, to the production of disease. Thus, a specific contagious poison is believed to be the direct cause of fever: in some, it may of itself suffice for the excitation of that disease, but in others it may, and in some it appears absolutely to, require the concurrent agency of the predisposition given by debility; in others, still, these two causes may prove innocuous till after exposure to cold, or cold and wet, or a debauch, or some unusual muscular exertion. What more easy than to overlook or deny the operation of any one of these causes, and especially of the unseen contagious poison?

It is obvious that a subject beset with such peculiar difficulties, and open to so many sources of error and fallacy, must involve, as Dr. Alison justly observes, a kind of evidence essentially different from that on which we proceed in other medical inquiries. The greater part of that evidence, indeed, must consist of comparative observations as to the circumstances under which diseases themselves originate; and decisive observations of this kind lie peculiarly in the way "of the medical officers of fleets and armies, who are perfectly informed of the whole circumstances of the organised bodies of men under their observation, and often see these circumstances suddenly altered, or have even the means of altering them at pleasure."* It may be added, that, superior as are the opportunities in this respect which these medical officers enjoy to those possessed by practitioners in civil life, "the peculiar value of such observations has never been so well understood as during the last war."

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* This sort of reasoning has been happily ridiculed, as Dr. Watson remarks, by comparing an epidemic to a battle. "A man might say,—'I was in the battle of Waterloo, and saw many men around me fall down and die, and it was said that they were struck down by musket balls; but I know better than that, for I was there all the time, and so were many of my friends, and we never were hit by any musket balls. Musket balls, therefore, could not have been the cause of the deaths we witnessed.' And if, like contagion, they were not palpable to the senses, such a person might go on to affirm that no proofs existed of there being any such things as musket balls." (Watson's Lectures, 1st edition, vol. 2, p. 700.)

But in the investigation of this subject we may also derive important aid from the observation of cases of sudden death, and the manner of their production, by the known and acknowledged agency of various external causes operating violently on the living body, or of the essential conditions of vitality being rapidly and completely withdrawn. The effects thereby produced on the vital parts or organs, their relation to their respective causes, and the circumstances under which the agency of these is exerted, are of such a nature, speaking generally, as not to admit of dispute. They are all matters of fact; clear, unequivocal, decisive. How admirably they thus serve to elucidate the more obscure agency of the external causes of diseases, is exceedingly well stated by Dr. Latham, and will appear from the remarks, at the close of this paper, taken from the "Clinical Lectures" of that distinguished physician. Nor is it a trifling service they render us in the investigation, that they dispose our minds to acknowledge the existence and the agency, as causes of disease, of influences that are wholly, or in a great part, hidden from actual observation, by shewing us indisputably that influences of a precisely similar kind do exist, and are capable of distroying life. Does any one deny that a peculiar poison engendered in, and emanating from, a human body labouring under fever, and received into the body of another, is the immediate cause of fever in this other? We may refer him to the rapidly fatal effects of the bite of the rattle-snake, and shew him in the animal the poison, and the organs containing it—and that, too, a fluid which chemistry cannot demonstrate to be poisonous—and compel his assent to this much at least, that in attributing fever to a specific animal poison we are not referring it to a cause different in kind from that whose agency he cannot but acknowledge.

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* Alison, Hist. of Med., in Cyc. of Prac Med., p. lxxxv. Outlines of Pathol. and Prac. of Med., pp. 47-8.

Enough, I hope, has now been said to shew the great interest and importance of the study of cases of sudden or violent death, as illustrative of the leading symptoms and the general nature of diseases,—of their more intimate or essential nature,—of their modes of fatal termination,—and of the agency of their remote or external causes; and that in respect of those diseases especially which are the most dangerous to life, and, therefore, most demand our attentive consideration.

The study of them may, accordingly, be recommended to the serious attention of the practitioner, as being well fitted to aid him essentially at the bed-side of the sick, by enabling him in obscure and perplexing cases of disease to judge more accurately than otherwise he might be able to do, regarding the diagnosis, prognosis, and treatment. And in an especial manner may it be recommended to that of the medical student, as the best possible introduction (after the preliminary studies in anatomy, physiology, materia medica, and chemistry), to the more difficult study of diseases.

It is with such or similar views of the great value of this study, that Dr. Alison very properly begins his Outlines of Pathology and Practice of Medicine, by the consideration of "Cases of sudden or violent death." "The simplest exemplification (he remarks), of the laws of morbid action is to be found in cases of sudden death, and in the action of violent injuries; and we therefore premise a short account of different fatal injuries to discussions on the pathology of any diseases;"—remarking also, that "having illustrated those cases, we may afterwards refer to them with advantage, as the facts most analogous to the changes that constitute disease." And, elsewhere*, speaking of the difficult study of diseases of the nervous system, he observes, that "the proper course to be pursued is—first, to study the various primary effects of external injury, whether concussion (previous to the accession of inflammation), or compression from depressed bone or effused blood; next, the effects on the functions of the nervous system, of other external causes operating suddenly and violently—cold, heat, electricity, hæmorrhage, and especially narcotic poisons; and then, having acquired precise information as to the direct effects of these powerful external agents on the nervous system, to direct our attention, last of all, to its diseased states resulting from internal changes."

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* Brit. and For. Med. Review, vol. iii. p. 303.

Dr. Latham, also, in a manner peculiarly his own, and with singular force and clearness, expresses similar sentiments. Speaking of forensic medicine, he says—

"I know no department of public teaching which, if it be entrusted to good hands, promises more benefit to medical science and medical practice than this. It undertakes to illustrate the modes in which injury, disease, or death, arrive from those external agents or accidents that are most signally hurtful to animal life; from poisons of every kind; from lightning; from hanging and drowning; from corruption of the air; and from every method of simple violence. Thus forensic medicine is conversant with all the highest points of physiology and pathology; and its very purpose requires the greatest exactness in the nature and display of its proofs. It requires, in truth, that they should be so made out as to be obvious to such understandings as ordinary men are accustomed to bring with with them into a jury-box.

"Here, then, is provision made, within a large and interesting field, for demonstrating to you the effects of external agents as the causes of disease, and all *matters of fact*.

"The display of the fatal effects resulting from the causes enumerated to several vital parts and organs, furnishes so many demonstrations of the possible ways in which the same parts and organs are capable of suffering from causes less hurtful. Not long ago, poisoning was an affair of the utmost darkness and mystery; but now, the rationale of poisoning in its several kinds is so well made out, that I am able to refer to it for the best instances which pathology affords of cause and effect in the manifest influence of external agents and accidents for the production of disease.

"Poisoning and the severer injuries, are *a sort of pathological experiments.* They produce upon this or that organ all the phenomena which any conceivable disease can exhibit; and they produce them in the greatest simplicity, because the subject is often previously in a state of health. Thus it is that they furnish an admirable introduction to the study of what is called spontaneous disease in the same organs."*

In concluding this paper, I beg to direct attention to the Review, in the 26th volume of the Edin. Med. and Surg. Journal, of Mr. Travers' work on "Constitutional Irritation," as a source of most valuable information on this interesting and important subject in its relations to pathology and practice of medicine.

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* Lectures on Subjects connected with Clinical Medicine. 1836. pp. 125-6-7.

THE END.

Wilson and Ogilvy, Printers, 57, Skinner Street, Snowhill, London.